

# Passive Optical Sample Assembly (POSA-2) Space Flight Experiment

NASA Lewis Research Center's Electro-Physics Branch is participating in the POSA-2 Space Flight Experiment to assess the effects of low Earth orbit and spacecraft environment contamination on power system materials and surfaces. This experiment package will be flown for 1 year in low Earth orbit and will be returned to Earth for subsequent evaluation of optical and thermal properties. Representative samples of solar-array blanket materials, solar dynamic reflector materials, thermal control coatings, and sapphire are included in the experiment package.



*Researchers installing samples in the POSA-2 flight experiment trays.*

Thirty Lewis optical and thermal control coating samples were prepared, characterized, and integrated on the POSA-2 carrier. One-inch-diameter Kapton disks, with and without a protective silicon dioxide coating, were stamped out of stock material, dehydrated, and weighed. Aluminum disks with a proprietary leveling coating were coated by electron-beam evaporation with a reflective coating of either aluminum or silver and with a protective coating of aluminum oxide and/or silicon dioxide.

In addition to mass measurements, total, diffuse, and specular reflectivity values were obtained on these samples through the use of a Perkin-Elmer Lambda-9 spectrophotometer equipped with a 150-mm-diameter integrating sphere.

The optical properties of thermal control coatings provided by the Illinois Institute of Technology Research Institute (IITRI) were evaluated in the visible range with an AZ Technology LPSR-200 reflectometer and in the infrared range with a Gier-Dunkle DB-100 reflectometer. Sapphire contamination monitors also were prepared for flight. Each type of sample was prepared in duplicate to accommodate the unusual opportunity to fly identical samples in both the ram and wake directions simultaneously. The samples were integrated in collaboration with the Boeing Space and Defense Group, Kent, Washington. Vibration testing is scheduled at the NASA Langley Research Center, and launch is

expected in early 1996.

POSA-2 should provide important information on the durability of materials to the low-Earth-orbit space environment in the near vicinity of spacecraft. It also should provide information on potential contamination and debris-related issues.